The CRIRSCO Reporting Codes and the UNFC: Do we really need separate codes for minerals reporting by governments and industry?

*Edmund Sides (PERC)*

*MinSouth Prestige Lecture*

*London, 13th June 2024*
Edmund Sides – Minsouth Prestige lecture, 13-Jun-2024

Presenter – EurGeol Dr Edmund Sides PGeo

• Professional
  • Chairperson, PERC
  • Deputy Chair, CRIRSCO
  • IGI representative on PERC
  • PERC representative on CRIRSCO

• Consultancy
• Director – Orebody Risks Limited
• > 30 years of relevant experience
• Main experience:
  • Orogenic gold, volcanic-hosted massive sulphide base metal and porphyry copper deposits;

• Significant experience:
  • Rare earth elements, iron ore, platinum group metals and carbonate-hosted lead-zinc;

LinkedIn:
www.linkedin.com/in/ed-sides-99866030/
The Pan-European Reserves and Resources Reporting Committee

- A 'not-for-profit' organisation registered in Brussels
- Association of six professional organisations
- Developed & maintains the PERC Reporting Standard
- A constituent member of CRIRSCO:
  - The Committee For Mineral Reserves International Reporting Standards
  - Recognised as the National Reporting Organisation (NRO) responsible for developing mineral reporting standards and guidelines in Europe

- More details available at:
  - www.percstandard.org
  - www.crirsco.com
Topics to be discussed

• Why do we need Mineral Reporting Standards?

• Two different types of Mineral Reporting
  • Public Reporting – CRIRSCO codes and standards
  • Non-public reporting - UNFC

• Relevance to the European minerals industry
  • The EU’s Critical Raw Materials Act and the UNFC
  • CRIRSCO Template to UNFC Bridging Document

• Summary and conclusions
Why do we need Mineral Reporting codes and standards?

Image: Neves-Corvo mine, Portugal, 2014
## Mineral Reporting Codes & Standards

<table>
<thead>
<tr>
<th>System</th>
<th>Date</th>
<th>Main usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian classification system (GKZ)</td>
<td>1927</td>
<td>Used for strategic planning, permitting and taxation by governments in the Soviet Union</td>
</tr>
<tr>
<td>Industry Guide 7 (SEC, US)</td>
<td>1933-1934</td>
<td>Issuing and trading of securities (stock exchange)</td>
</tr>
<tr>
<td>Mineral Resource Classification System (USBM &amp; USGS)</td>
<td>1943 &amp; 1976</td>
<td>Strategic planning by the US government</td>
</tr>
<tr>
<td>JORC Code</td>
<td>1989</td>
<td>Stock exchange reporting (Australasia)</td>
</tr>
<tr>
<td>UNFC (UNECE)</td>
<td>1997</td>
<td>Unifying international system for classifying solid minerals and fuels (mainly for use by government organisations)</td>
</tr>
<tr>
<td>NI 43-101 legislation</td>
<td>2001</td>
<td>Standards of Disclosure for Mineral Projects within Canada (applicable to all companies offering shares to Canadian investors)</td>
</tr>
<tr>
<td>CRIRSCO Template</td>
<td>2006</td>
<td>Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves (to investors and their advisors)</td>
</tr>
</tbody>
</table>

**NOTE: **Developed into the PERC Reporting Standard
Financial market regulation

*Image: Toronto Stock Exchange (c. 1937-39), (Alexandra Studios)*
https://commons.wikimedia.org/wiki/File:New_Toronto_Stock_Exchange_trading_floor.jpg
Financing mining projects

- Project finance
  - Required in order to explore and develop mines
  - Commonly obtained using **equity and debt financing**
  - Most jurisdictions have rules governing access to equity finance

- Government securities laws allow:
  - Companies to sell shares to the public – primary market
  - Public to trade those shares – secondary market

- Subject to misinterpretation and abuse:
  - 1969-1970: Poseidon nickel bubble, Australia
  - 1993-1997: Bre-X fraud, Busang gold deposit, Indonesia
  - 2006-2007: Southwestern Resources Corp., Boka project, China
  - 2024: Red Pine Exploration – Wawa Gold deposit, Ontario
The IMM’s role in Minerals Reporting

International

- Hoover, Principles of Mining 1909
- CMMI definitions (Denver) 1997
- CMMI/UNFC definitions (Geneva) 1999
- NI 43-101 (Canada) 2001
- CRIRSCO International Reporting Template 2006
- CRIRSCO International Reporting Template 2013
- CRIRSCO International Reporting Template 2019

European

- 1902 IMM ‘ore-in-sight’
- 1991 IMM definitions
- 2001 The Reporting Code (EFG-GSL-IGI-IMM)
- 2008 PERC Reporting Code
- 2013 PERC Reporting Standard
- 2017 PERC Reporting Standard
- 2021 PERC Reporting Standard

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“That the Members of the Institution be urged to protect the best interests of the Profession by using their influence in every way possible to prevent and discourage the use of the term “Ore in Sight” except as defined above; and the Council also strongly advise that no ambiguity or mystery in this connection should be tolerated, as they (the Council) consider that such ambiguity is an indication of dishonesty or incompetency.”

Source: IMM Council, 30th September 1902
Financial Market regulation

• Main objective
  • All investors must be placed on an equal footing
  • ‘Level playing field’

• Types of market abuse:
  • Insider dealing:
    • where a person who has information not available to other investors makes use of that information for personal gain
  • Market manipulation:
    • where a person knowingly gives out false or misleading information in order to influence the price of a share for personal gain

Source: https://en.wikipedia.org/wiki/Market_abuse (based on Summaries of EU legislation)
Reporting obligations

- **Regulations**
  - Set requirements for when and how investors are informed about an **issuer**’s activities

- **Disclosure**
  - The act of releasing all relevant information on a company that may influence an investment decision

- **Material Information**
  - Any information about a company or its products that is likely to change the perceived value of a security when it is disclosed to the public

Based on: https://www.investopedia.com; and http://www.businessdictionary.com
The CRIRSCO codes and standards (Public Reporting)

A brief introduction
## CRIRSCO Codes and Standards

<table>
<thead>
<tr>
<th>Region</th>
<th>Standard/Code</th>
<th>Year of last update</th>
<th>CRIRSCO template version</th>
<th>NRO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkey</td>
<td>The UMREK Code</td>
<td>2022</td>
<td>2019</td>
<td>UMREK</td>
</tr>
<tr>
<td>Brazil</td>
<td>CBRR Guide</td>
<td>2022</td>
<td>2019</td>
<td>CBRR</td>
</tr>
<tr>
<td>Europe</td>
<td>PERC Reporting Standard</td>
<td>2021</td>
<td>2019</td>
<td>PERC</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>KAZRC Public Reporting Code</td>
<td>2021</td>
<td>2019</td>
<td>KAZRC</td>
</tr>
<tr>
<td>India</td>
<td>Indian Mineral Industry Code (IMIC)</td>
<td>2019</td>
<td>2013</td>
<td>NACRI</td>
</tr>
<tr>
<td>Colombia</td>
<td>ECRR Standard</td>
<td>2018</td>
<td>2013</td>
<td>CCRR</td>
</tr>
<tr>
<td>Indonesia</td>
<td>KCMI Code</td>
<td>2017</td>
<td>2013</td>
<td>KCMI</td>
</tr>
<tr>
<td>USA</td>
<td>The SME Guide</td>
<td>2017</td>
<td>2013</td>
<td>SME</td>
</tr>
<tr>
<td>South Africa</td>
<td>The SAMREC Code</td>
<td>2016</td>
<td>2013</td>
<td>SAMCODES</td>
</tr>
<tr>
<td>Chile</td>
<td>Chilean Reporting Code</td>
<td>2015</td>
<td>Not stated</td>
<td>Comisión Minera</td>
</tr>
<tr>
<td>Canada</td>
<td>CIM Definition Standards</td>
<td>2014</td>
<td>Not stated</td>
<td>CIM</td>
</tr>
<tr>
<td>Mongolia</td>
<td>The MRC Code</td>
<td>2014</td>
<td>2013</td>
<td>MPIGM</td>
</tr>
<tr>
<td>Russia</td>
<td>The NAEN Code</td>
<td>2013</td>
<td>2013</td>
<td>NAEN</td>
</tr>
<tr>
<td>Australasia</td>
<td>The JORC Code</td>
<td>2012</td>
<td>2012 definitions</td>
<td>JORC</td>
</tr>
</tbody>
</table>

**NOTE:** Last updated 13-Nov-2023

**NOTES:**

- **NRO = National Reporting Organisation**
  
  All 15 NROs use identical (or not materially different) definitions for the 16 CRIRSCO defined terms.

  The Canadian NI 43-101 legislation incorporates by reference the CIM Definition Standards.
  
  In the USA, the SEC’s regulation S-K, subpart 1300, also uses definitions which are closely aligned.
CRIRSCO reporting framework

• Principles based
  • Transparency, Materiality and Competence

• Public Reporting Guidelines
  • They do not prescribe how estimations should be done

• CRIRSCO International reporting template
  • Common definitions of 16 important terms
  • Table 1 checklist of assessment criteria

• Other considerations
  • Other regulations (e.g. NI 43-101 Form F1)

For more details download the CRIRSCO Template from:
CRIRSCO Template – Figure 1

Non-Public Reporting and the UNFC

Image from:
Assessment of Undiscovered Copper Resources Associated with the Permian Kupferschiefer, Southern Permian Basin, Europe (USGS, 2010)
What is Non-Public Reporting?

• Definition
  • No formal definition in the CRIRSCO Codes
  • Referred to by several stock exchanges
  • Generally understood to mean
    • The generation of reports which are not intended for public dissemination, but...
    • Also includes estimates based on conceptual and theoretical studies

• Examples
  • Reports to government for licence applications or renewal
  • Reports to government on ‘mineral inventory’ for use in strategic planning
  • Reports to accompany planning applications
  • Internal reports used for strategic planning
Differing Requirements?

**Strategic planning**
- Inventory of mineral assets
- Information for use in strategic planning of infrastructure, land use, etc.
- Potential for future discoveries
- Potential social and environmental effects of minerals related activities
- Information about closure planning
- Estimates may include material that is not considered to be economically extractable
- May include estimates of undiscovered material

**Investment decisions**
- Information about an investment opportunity
- Economic viability of specific projects
- Risks related to project outcomes
- Estimates related to a specific extraction scenario
- Minerals material should have prospects for economic extraction
- Estimates relate to specific known occurrences which a company has the rights to explore and/or exploit
**Figure 1 – PERC (CRIRSCO)**

- **Conceptual and theoretical estimates**
  - Exploration
    - Results
      - Preliminary ‘resource’ estimates
      - MINERAL
  - RESOURCES
    - Sub-economic
      - Inferred
    - Indicated
    - Measured
  - MINERAL RESERVES
    - Probable
    - Proved

- **Increasing level of Geological Knowledge and Confidence**
- **Consideration of the Modifying Factors**
United Nations Framework Classification for Resources (UNFC)

Environmental-socio-economic viability (E)

Technical feasibility (F)

Degree of confidence in the estimate (G)

Application: “solar, wind, geothermal, hydro-marine, bioenergy, injection for storage, hydrocarbons, minerals, nuclear fuels and water”

# UNFC: Primary Classes & Categories

## Abbreviated Version of UNFC, showing Primary Classes

<table>
<thead>
<tr>
<th>Total Products</th>
<th>Produced</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sold or used production</td>
</tr>
<tr>
<td></td>
<td>Production which is unused or consumed in operations</td>
</tr>
<tr>
<td></td>
<td>Minimum Categories</td>
</tr>
</tbody>
</table>

| Class                | E | F | G<br>
|----------------------|---|---|---
| Viable Projects      | 1 | 1 | 1, 2, 3 |
| Potentially Viable Projects | 2<br> | 2 | 1, 2, 3 |
| Non-Viable Projects  | 3 | 2 | 1, 2, 3 |
| Prospective Projects | 3 | 3 | 4 |

### Source:
UNFC in the Minerals Sector

• UNFC is applied in two slightly different ways:

  • Classification of estimates of a specified volume on an individual minerals project
    • Provides a framework for reporting estimates in a standardised manner.
    • Facilitates the incorporation of such estimates into mineral inventory databases held by companies, government bodies or other parties.

  • Classification of minerals projects (2009 onwards)
    • Provides a framework for comparing raw materials projects across the spectrum from exploration to extraction, processing, and recycling.
    • Facilitates project classification and monitoring.
Bridging Document

• A document that explains the relationship between UNFC and another classification system, including instructions and guidelines on how to classify estimates generated by application of that system using UNFC Numerical Codes.

Aligned System

• A classification system that has been aligned with UNFC as demonstrated by the existence of a Bridging Document that has been endorsed by the Expert Group on Resource Management.

Aligned Systems & Bridging

**Aligned Systems**
- NEA/IAEA ‘Red Book’ (Uranium)
- CRIRSCO Template aligned codes & standards
- Chinese Solid Minerals
- Petroleum Resource Management System (PRMS)
- Russian Federation Oil and Gas
- Chinese Petroleum system

**Other Systems**
- Systems based on the Soviet Minerals Reporting system (GKZ)

**Bridging Documents***
- Bridging Document 1
- CRIRSCO Template to UNFC Bridging Document
- Bridging Document 3
- Bridging Document 4
- Bridging Document 5
- Bridging Document 6

(including consideration of Supplementary Specifications)

*Available to download from: [https://unece.org/sustainable-energy/sustainable-resource-management/unfc-documents#accordion_1](https://unece.org/sustainable-energy/sustainable-resource-management/unfc-documents#accordion_1)
The UNFC’s relevance to the European minerals industry

Image from: ORAMA (2019)

The EU’s Critical Raw Materials Act (CRMA)

Sep. 2022
14 Sept: Ursula von der Leyen - State of the Union address
30 Sept: Start of initial public consultation

2023
16 March: Publication of proposed Regulation
20 March to 30 June: Feedback on proposed (310 responses)
13 September: Approved by the EU Parliament
End of initial public consultation (258 responses)

23 May 2024
Published in the EU Bulletin
Legally came into force
Legal reference: 2024/1252

Revisions following consultations between:
• The European Parliament (EP);
• The Council of the European Union (CEU);
• The European Commission (EC); and
• The 27 Member States.

Further information:
CRMA – key elements

Important elements
• List of Critical Raw Materials (CRMs – total of 34)
• List of Strategic Raw Materials (SRMs – total of 17)
• Strategic Projects (SPs)
• Strategic Partnerships (SPSs)

EU targets for SRMs
• No single non-EU country should supply >65% of an SRM
• Extract >=10% of SRM source materials within EU where possible
• Produce >=50% of the EU’s SRM consumption
  • Up to 20% of new processing capacity outside EU (SPSs)
• Recycling to produce +10% of SRM supply
• Collect, sort & process 45% of SRM waste

Critical & Strategic raw materials

CRMA – references to the UNFC

• Use of UNFC in the context of the Act
  • 1. National and transnational mineral information databases:
    • Harmonisation of data and information for different countries and potential sources of raw materials
  • 2. Project Assessment and Monitoring:
    • Screening and ranking of projects for different ‘resources’ and industry sectors

• References to UNFC in the Act
  • Applications by a ‘promotor’ for a project to be recognised as a Strategic Project
    • (Article 7(1b));
  • Information to be provided to Commission by the Member States
    • (Article 19(6); Article 21(1); and Article 27(8)).

Strategic Project (SP) requirements

Article 7 – Application and Recognition: [SELECTED TEXT]

1. Applications for recognition ..... shall include:

   • (a) **relevant evidence** related to fulfilment of the criteria laid down in Article 6(1) [specifies the criteria for an SP];

   • (b) **a classification of the project according to the United Nations Framework Classification for Resources**, supported by appropriate evidence;

   • (c) **a timetable for the implementation** of the project, including an overview of the permits required for the project and the status of the corresponding permit granting process;

   • (d) a plan containing measures to facilitate public acceptance including, where appropriate, measures to facilitate the meaningful involvement and active participation of affected communities,…

Article 7 – Application and Recognition: [SELECTED TEXT continued]

(f) a business plan evaluating the financial viability of the project;

(g) an estimate of the project’s potential for quality job creation and the project’s needs in terms of skilled workforce and a work plan to support upskilling and reskilling...

(h) for projects in third countries or in OCTs* involving extraction, a plan to improve the environmental state of the affected sites after the end of exploitation.....

(j) for projects with the potential to affect indigenous peoples, a plan containing measures dedicated to a meaningful consultation of the affected indigenous peoples ......

NOTE: Article 7(2)

By 24 November 2024, the Commission shall adopt an implementing act establishing a single template to be used by project promoters for the applications referred to in paragraph 1 of this Article.

The single template may indicate how the information referred to in paragraph 1 of this Article is to be expressed. That implementing act shall be adopted in accordance with the advisory procedure referred to in Article 39(2)

NOTE *: OCT = Overseas country or territory

CRIRSCO-UNFC relationship

The updated CRIRSCO Template to UNFC Bridging Document

(Based on the 2019 versions of both systems)
Bridging Document Guidance Note – Contents

• I. INTRODUCTION
• II. BACKGROUND
• III. OVERVIEW OF SYSTEM CONTENTS
• IV. COMPETENCY AND QUALIFICATION REQUIREMENTS
• V. MAPPING CRIRSCO TEMPLATE TO THE UNFC CATEGORIES AND SUB-CATEGORIES
• VI. MAPPING UNFC 2019 TO THE CRIRSCO TEMPLATE 2019
• VII. References
• VIII. Appendix I: Key features of the CRIRSCO Template and the UNFC
• IX. Appendix II: Terminology
• + 3 Figures and 9 Tables
# Standard Mapping (Table 2)

<table>
<thead>
<tr>
<th>Public Report and Study Types(^a)</th>
<th>Standard Definitions</th>
<th>Corresponding UNFC Category(^c)</th>
<th>UNFC Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feasibility Study or Life of Mine Plan(^b) (for an operating mine)</td>
<td>Mineral Reserves</td>
<td>Proved</td>
<td>E1</td>
</tr>
<tr>
<td>Pre-feasibility Study(^d)</td>
<td>Mineral Reserves</td>
<td>Proved</td>
<td>E2</td>
</tr>
<tr>
<td>Feasibility Study, Life of Mine Plan(^b) (for an operating mine) or Pre-feasibility Study(^e)</td>
<td>Mineral Resources (exclusive of Mineral Reserves)</td>
<td>Measured</td>
<td>E2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Indicated</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inferred</td>
<td></td>
</tr>
<tr>
<td>Scoping Study report or other Public Report on a Mineral Resource estimate(^f)</td>
<td>Mineral Resources</td>
<td>Measured</td>
<td>E2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Indicated</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inferred</td>
<td></td>
</tr>
<tr>
<td>Public Report on exploration stage projects</td>
<td>Exploration Target</td>
<td></td>
<td>E3</td>
</tr>
<tr>
<td></td>
<td>Exploration Results</td>
<td>Estimates not published</td>
<td></td>
</tr>
<tr>
<td>Not applicable(^g)</td>
<td>Estimates obtained from historical reports(^h)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: [https://unece.org/sites/default/files/2024-04/CRIRSCO_Template_UNFC_BD_ECE_ENERGY_GE.3_2024_5_ENG.pdf](https://unece.org/sites/default/files/2024-04/CRIRSCO_Template_UNFC_BD_ECE_ENERGY_GE.3_2024_5_ENG.pdf)
Edmund Sides – Minsouth Prestige lecture, 13-Jun-2024

For more information see: https://percstandard.org/perc-standard/#mper
Summary and conclusions
Summary

• Mineral Reporting systems provide information for:
  • State mineral information systems
    • UNFC
  • Stock markets and investors
    • CRIRSCO aligned codes & standards

• Important elements
  • Common terminology and/or numeric coding
  • Communicating uncertainty/risk
  • Principles: Transparency, Materiality & Competence

• CRIRSCO Template – UNFC relationship
  • Complementary systems – designed for different purposes
  • Bridging document facilitates their use together
Future challenges

• Addressing some of the limitations
  • Incorporating the time element
  • Estimating final product quantities
  • Reference point of estimation

• Tackling new challenges
  • Dealing with by-products / downstream products

• Practical application of ‘ESG’ aspects
  • Increasing public acceptance of mining in Europe
  • ‘Stream-lined’ permitting
  • Life Cycle assessment
  • Carbon border taxes
PERC activities and priorities

• Training / outreach
  • The PERC Reporting Standard and the UNFC
  • Using the CRIRSCO Template to UNFC Bridging Document

• Promotion
  • Promoting the use of the PERC Reporting Standard in Europe

• Developing guidance documents
  • Mineral Project Evaluation Report template
  • Integrated approach to mineral assessment

• Networking
  • Communicating with legislators and regulators
  • Facilitating dialogue between ‘government’ and the minerals industry
  • Liaising with the UNECE (UNFC)
Additional information

Provides links to some sources of further information
Session 1 – Videos

• Video 1 – What is PERC?
  • https://youtu.be/6m-FwDHV_8Q [2m 40s]

• Video 2 – Bre-X investor reflects: (see embedded video in the following article)
  • https://www.cbc.ca/news/canada/edmonton/gold-bre-x-scandal-investment-movie-memories-alberta-1.3957034 [1m 23s]

• Video 3 – Navigating the PERC Reporting Standard
  • https://youtu.be/U3hchp6tk_o [5m 13s]
Some Recommended Reading

- **Mineral Reporting Standards: PERC’s Role in CRIRSCO and Its Relevance to the European Mining Sector**
  - Edmund Sides* and Ruth Allington; Earth Sci. Syst. Soc., 27 March 2024
  - Original article: [https://www.escubed.org/articles/10.3389/esss.2024.10080/full](https://www.escubed.org/articles/10.3389/esss.2024.10080/full)
  - Spanish version: “Normas de Información Minera: El papel de PERC en CRIRSCO y su Relevancia para el Sector Minero Europeo”.
  - Available at: [https://lnkd.in/ddtw-3Ep](https://lnkd.in/ddtw-3Ep)

- **The PERC Summary Guide**
  - PERC, December 2022 (1st Edition)

- **PERC, CRIRSCO, and UNFC: minerals reporting standards and classifications**
  - Stephen Henley* and Ruth Allington; European Geologist 36 (2013)
CRIRSCO & UNECE References

- **UNECE (2024)** Bridging Document between the Committee for Mineral Reserves International Reporting Standards Template and the United Nations Framework Classification for Resources, approved and issued 22 April 2024. Available at:
  - https://unece.org/sites/default/files/2024-04/CRIRSCO_Template_UNFC_BD_ECE_ENERGY_GE.3_2024_5_ENG.pdf


- **UNECE (2022)** Guidance Note on Competency Requirements for the Estimation, Classification and Management of Resources. Prepared by the Competency Working Group of the Expert Group on Resource Management, Dated 25 October 2022. Available at:

- **UNECE (2021)** Supplementary Specifications for the Application of the United Nations Framework Classification for Resources to Minerals. Available at:
